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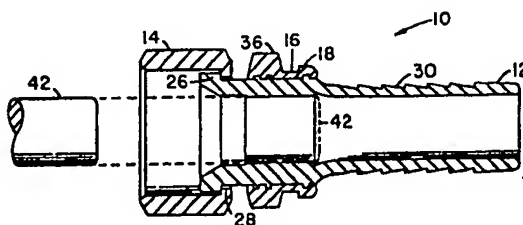
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⑤④ Hose stem with locking collar and method.

⑤⑦ A multi-piece hose stem with a nipple and external
sleeve that defines a ferrule locking collar, the sleeve attach-
ed to the nipple by a preferred method of radially expanding
a portion of the nipple to contact and hold the sleeve.



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HOSE STEM WITH LOCKING COLLAR AND METHOD

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Background of the Invention

The invention relates to couplings of the stem-ferrule type that attach to reinforced, flexible hose, but more particularly, the invention relates to a hose stem with a ferrule locking collar.

Couplings that are post assembled to a hose typically include a stem that inserts into a hose end and a ferrule that is concentric with the stem. Together, the stem and ferrule define a coupling with an annular cavity for encircling the hose end. The coupling is retained to the hose end by pinching it between the ferrule and stem. Pinching is accomplished by either radially reducing the ferrule or radially increasing the stem.

In high pressure hose applications, it is necessary to retain the ferrule to the stem. In many coupling designs, the ferrule has an internal collar that extends behind an external collar of the stem.

1 Hose stems have a fitting end portion, a
hose end portion, and an intermediate locking
collar. The fitting end portion may have any suitable
fitting configuration. As examples, the fitting end
5 portion may be configured with male pipe threads; an
external collar that retains a female swivel nut; or a
tubular extension that terminates into an O-ring
retaining flange.

10 The stem may be formed of several individual
parts for economical reasons or to accommodate various
fitting configurations. The assembly of several stem
parts may introduce performance problems. For example, a
swivel nut may be attached to the stem by crimping a
15 portion of it over an external collar. The so crimped
portion is subject to bending when the fitting is
attached to another part or when the hose is subjected to
high pressure. Such bending of the crimped swivel nut
portion may cause leakage making such a fitting
20 unsuitable for some applications.

 U.S. Patent 2,926,029 to St. Clair et al, shows
a two-piece hose stem where the ferrule locking collar is
made as an integral part of the fitting end portion. A
25 nipple is partially inserted into the fitting end and
brazed to form a hose end portion. The problem with a
stem of this type is that any failure of the brazed
joint subjects the coupling to leakage.

30 Another example of a multi-piece stem is the
type where a locking collar is formed as an integral part
of the hose end portion. A tubular extension that
terminates into an O-ring retaining flange is partially
inserted into the hose end portion and brazed thereto.
35 Like the previous example, the problem with such a stem
is that any failure of the brazed joint subjects the
assembled coupling to leakage.

In accordance with the invention, a multi-piece
5 hose stem is provided that overcomes the internal joint
leakage problem and the swivel nut flexure problem
associated with the prior art. The stem of the invention
is made with a nipple that has a fitting end portion, a
hose end portion, and an intermediate portion that is
10 encircled by a sleeve having an integral, ferrule
locking collar. The sleeve is attached to the nipple
such as with threads, by brazing, or more preferably, by
radially expanding the intermediate portion of the nipple
so that ribs thereon interfit with internal ribs of the
15 sleeve. The manner in which the sleeve is attached to
the nipple permits advantageous fitting end
configurations.

A swivel nut with an internal collar is
20 prepositioned over the nipple so that the collar abuts an
external collar that is an integral part of the nipple.
The sleeve is then positioned and attached to the nipple
which retains it in place. The swivel nut collar is
fabricated with sufficient bulk to prevent flexural
25 movements that can lead to leakage.

In another configuration, the nipple defines a
tubular section that terminates into a flange that may be
fitted with an O-ring. The tubular extension may be bent
30 to a desired curve as known in the art. The sleeve is
attached to the nipple at the intermediate portion such
as in the manner above discussed.

Under the method of the invention, the nipple
35 is formed with an intermediate portion for attaching a
sleeve. A sleeve with a collar is placed over the
intermediate portion and the nipple is radially expanded

1 to contact the sleeve and attach it into position. The
nipple may be radially expanded by forming an internal
collar in the nipple opposite the intermediate portion.
A tool such as a punch having a larger diameter than that
5 of the internal collar is pushed through the nipple
thereby radially expanding it into the sleeve.

The invention is further described by way of
example with reference to the accompanying drawings, in
10 which:

Figure 1 is an exploded side view of a hose
stem of the invention of the swivel nut type;

15 Figure 2 is an axial section showing the
assembled parts of Figure 1 prior to attaching the
sleeve;

Figure 3 is a view similar to Figure 2 but
20 showing the nipple radially expanded attaching the
sleeve;

Figure 4 is a view taken along the lines 4-4 of
Figure 2 showing an alternate means for attachment;
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Figure 5 is a view similar to Figure 4 and
showing an alternate means for attachment;

Figure 6 is a side view of an alternate sleeve
30 of the invention that includes wrenching surfaces; and

Figure 7 is an axial section of a hose stem
with an extended fitting end portion that terminates into
a flange and a hose end portion that is coupled to a hose
35 with a ferrule attaching to the locking collar and sleeve
of the type shown in Figure 6.

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Description of Preferred Embodiments

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Referring to Figures 1-3, a hose stem 10 of the swivel nut type is illustrated. The three component part stem includes a nipple 12, swivel nut 14, and a sleeve 16 with an integral ferrule locking collar 18. The nipple has a fitting end portion 20, a hose end portion 22, and an intermediate sleeve attachment portion 24.

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The fitting end portion may have any desired configuration such as male pipe threads, a flange, or a swivel nut adaptation as illustrated. An external collar 26 is formed at the end of the nipple for retaining the swivel nut. The swivel nut is positioned over the nipple to encircle the collar so that an internal collar 28 on the nut abuts the collar on the nipple. The internal collar of the nut has a thickness that inhibits detrimental flexing when the stem is in use. Both the internal collar of the nut and external collar of the nipple may have squared shoulders to ensure a good force transfer from the nut to the nipple.

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The hose end portion of the nipple may have any desired configuration such as a cylindrical surface (not shown) or a plurality of circumferential ribs 30 as illustrated.

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The intermediate portion of the nipple defines a sleeve attachment portion which also preferably includes a plurality of external circumferential ribs 32. The ribs may have any desired axial spacing. The sleeve has an internal nipple attachment portion which preferably includes a plurality of circumferential ribs 34. The axial spacing and size of the ribs substantially are matched to interfit with the ribs of the nipple. Optionally, the sleeve has a flange like member 36 which acts

1 as a stop for a ferrule and for the swivel nut. The
nipple may have an external locating collar 38 near the
intermediate sleeve attachment portion which is slightly
larger in diameter than the internal diameter of the
5 sleeve. When a sleeve is positioned over the nipple as
shown in Figure 2, the locating collar positions the
sleeve so that the circumferential ribs of the nipple and
the sleeve are aligned juxtaposed each other. The sleeve
is attached to the nipple by radially expanding the
10 intermediate portion of the nipple. The intermediate
portion may be expanded in a variety of ways. A
preferred manner is achieved by providing the nipple with
an internal collar 40 in the nipple ferrule. The
internal collar 40 is located juxtaposed the intermediate
15 sleeve attachment portion in the area of the
circumferential ribs. A tool 42 having a larger diameter
than the internal diameter of the collar is pushed there
through which expands the nipple and attaches the sleeve
thereto.

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The sleeve may be attached to the nipple in a
number of ways. Referring to Figure 4, the nipple has
external threads 44 and the sleeve has internal threads
46. The sleeve is attached by screwing it over the
25 nipple.

Figure 4 illustrates another manner in which
the sleeve may be attached to the nipple. As shown, the
sleeve is attached to the nipple by welding or brazing
30 48.

Referring to Figures 6 and 7, another stem 50
of the invention is illustrated. The sleeve 52 is
similar to that as above described except that the
35 flange-like member 54 of the sleeve defines a plurality
of wrenching surfaces 56. The fitting end portion of the
nipple defines a tubular extension 58 that terminates

1 into a flange 60 that optionally retains an O-ring 62.
The tubular member may be bent to any desired curve (not
shown). The sleeve 52 is attached to the nipple by
expanding the intermediate attachment portion by means of
5 an internal collar and a punch using the method as above
explained.

Figure 7 also illustrates the stem of the
invention when used to couple hose. The hose end portion
10 of the stem is inserted into a hose 64 and a ferrule 66
is positioned over the hose end. The ferrule is reduced
in diameter such as by crimping or swagging which
positions a collar 68 of the ferrule behind the ferrule
locking collar 18 of the sleeve. The crimping may cause
15 the stem to slightly collapse to a somewhat frustoconical
shape 70 juxtaposed the locking collar. The radially
outwardly expansion of the sleeve followed by the
radially inward collapse of a portion of the sleeve does
not impair its attachment. It has been determined that
20 the attachment is sufficient to withstand the normal
wrenching torque that may be applied at the wrenching
surfaces.

The foregoing detailed description is not
25 intended to limit the scope of the invention which is to
be determined from the appended claims.

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1 1. A hose stem comprising:

5 a nipple having a bore, a hose end portion, a
fitting end portion and an intermediate,
sleeve attachment portion;

10 a sleeve having a bore with an internal nipple
attachment portion, the sleeve concentric
with the nipple and positioned so the
sleeve attachment portion and nipple
attachment portion interface each other;

15 an external ferrule locking collar formed as an
integral part of the sleeve; and

means for attaching the sleeve to the nipple at
the sleeve and nipple attachment portions.

20 2. The hose stem as claimed in Claim 1
wherein the attaching means comprises a brazed joint.

25 3. The hose stem as claimed in Claim 1 wherein
the attaching means comprises external threads on the
nipple that interfit with internal threads on the
sleeve.

30 4. The hose stem as claimed in Claim 1 wherein
the attaching means comprises external circumferential
ribs on the nipple and internal circumferential ribs on
the sleeve, the sleeve attachment portion of the nipple
radially expanded and the external and internal ribs
35 interfitting with each other.

1 5. The hose stem as claimed in Claim 4 wherein
the nipple has an internal collar in the bore at the
intermediate attachment portion, the collar radially
expanded with the nipple and defining a part of the
5 attachment means.

 6. The hose stem as claimed in Claim 1 wherein
the sleeve has an integral flange like member which is
10 longitudinally spaced from the ferrule locking collar
toward the fitting end portion of the nipple.

 7. The hose stem as claimed in Claim 7 wherein
15 the flange like member defines a plurality of wrenching
surfaces.

 8. The hose stem as claimed in Claim 1 wherein
20 the nipple has an external nut retaining collar at the
fitting end, and further includes:

 a swivel nut with an internal collar that
 encircles the nipple and abuts the nut
25 retaining collar.

 9. The hose stem as claimed in Claim 1
wherein the nipple defines a tubular extension at the
30 fitting end that terminates into an external flange.

 10. The hose stem as claimed in Claim 1
wherein the nipple has a positioning collar near the
35 sleeve attachment portion that abuts and locates the
sleeve.

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11. A hose stem comprising:

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a nipple having a hose end portion, a fitting
end portion and an intermediate portion
with external circumferential ribs; and

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a collared sleeve having internal
circumferential ribs encircling the nipple
at the intermediate portion, the nipple
radially expanded at the intermediate
portion and the ribs of the nipple and the
ribs of the sleeve interdigitating with
each other attaching the sleeve to the
nipple.

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1 12. A method for making a hose stem with a
ferrule locking collar comprising the steps of:

5 forming a nipple with a hose end portion, a
fitting end portion and an intermediate
portion;

10 forming a sleeve with an external, ferrule
locking collar;

15 positioning the sleeve over the intermediate
portion of the nipple;

20 radially expanding the intermediate portion of
the nipple and simultaneously attaching
the sleeve to the nipple.

25 13. The method as claimed in Claim 12 which
further includes the steps of:

30 forming the nipple with an internal collar at
the intermediate portion, the internal
collar having an internal diameter; and

35 pushing a tool having a larger outside diameter
than that of the internal collar, through
said collar and simultaneously radially
expanding the intermediate portion of the
nipple.

